* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1]A damper comprising:
The first solid of revolution possessing an attachment part for attaching enabling free rotation.
The second solid of revolution that formed a crevice which accommodates a viscous body and was provided relatively to the first solid of revolution between this first solid of revolution enabling free rotation.
Transmit nonlinearly a rotation of the first solid of revolution centering on an attachment part to the second solid of revolution, and. A rotation transmission means to change a resistance force to rotations of the first solid of revolution centering on an attachment part which originates in viscous resistance of a viscous body produced in mutual relative rotation with the first solid of revolution and the second solid of revolution in rotation of the first solid of revolution centering on an attachment part.

[Claim 2]The damper according to claim 1 constituted so that a means of rotation transmission may change said resistance force based on an angle of rotation of the first solid of revolution and the second solid of revolution.
[Claim 3]The damper according to claim 1 or 2 constituted so that a means of rotation transmission may change a running torque radius of the second solid of revolution to the first solid of revolution and may change a resistance force.
[Claim 4]A damper comprising:
in an attachment part and homotopic, an end can attach a means of rotation transmission to the first solid of revolution, enabling free rotation -- ****** -- the first arm.
The second arm to which an end comes to adhere to the second solid of revolution.
An engagement means with which the other end of the second arm is made to engage to the other end of the first arm, enabling rotation relatively free

[movement] and free.

[Claim 5]A damper comprising:
A fitting groove where an engagement means was formed in the other end of one arm among the first and the second arm.
A piece fitted in enabling free movement to this fitting groove.
An axis which supported this piece, enabling free rotation and was provided in the other end of an arm of another side among the first and the second arm.

[Claim 6]A damper comprising:
A fitting groove where an engagement means was formed in the other end of one arm among the first and the second arm.
A piece fitted in enabling free movement to this fitting groove.
An axis which this piece adhered and was provided in the other end of an arm of another side among the first and the second arm enabling free rotation.

[Claim 7]A damper comprising:
A fitting groove where an engagement means was formed in the other end of one arm among the first and the second arm.
A cylinder body or a column body which was fitted in enabling free movement to this fitting groove, and was provided in the other end of an arm of another side among the first and the second arm.

[Claim 8]The damper according to any one of claims 1 to 7 it was made to make generate viscous shear strength in a viscous body accommodated in a crevice in mutual relative rotation with the first solid of revolution and the second solid of revolution.
[Claim 9]A step parking brake which uses the damper according to any one of claims 1 to 8 for a pedal arm.

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application]This invention relates to the damper which fitted the rotation giving a predetermined resistance force to the member which reclining seats, such as a pedal arm of a damper, for example, a step parking brake, a large-sized pivoted window, and a car, etc. rotate.
[0002]
[Description of the Prior Art]As this kind of a damper, it is provided to housing and this housing, enabling free rotation, and the conventional proposal of the thing possessing the solid of revolution which makes the viscous body enclosed in housing by the relative rotation to housing produce viscous shear strength of a type is made for example.
[0003]
[Problem(s) to be Solved by the Invention]By the way, in this conventional type of damper, when relative rotating speed is [it is mutual / between the housing and solid of revolution under operation] the same, Since the resistance force to generate becomes the same in any rotary place of the solid of revolution to housing, For example, in the case where it uses as a thing to which the return to the initial position of the pedal arm of a step parking brake is made to perform smoothly, If the resistance force immediately after the treading-in release to a pedal arm is designed as sufficient thing, the resistance force in the neighborhood where the rotation return of the pedal arm is carried out in an initial position becoming large more than needed, therefore the recovery time to the initial position of a pedal arm becoming late, on the other hand, If a pedal arm makes low the resistance force in the neighborhood which returns to an initial position, designs it and makes a desired thing recovery time to the initial position of a pedal arm, The resistance force immediately after the treading-in release to a pedal arm will not become sufficient, but it rotates with sufficient vigor to an initial position, a pedal arm crashes into a

stopper, and there is fear, such as breakage of a tap tone and the pedal arm by a shock, and a stopper.
[0004]The place which this invention is made in view of said many points, and is made into the purpose, For example, it is in providing the damper which fitted the rotation giving a predetermined resistance force to the member which reclining seats, such as a pedal arm of a step parking brake, a large-sized pivoted window, and a car, etc. rotate.
[0005]There is a place made into other purposes of this invention in being able to make it the thing of a request of return rotating speed and the return time required to the member to rotate, being able to avoid the crash to the stopper in an initial position, etc., and providing the damper which can abolish fear, such as basing-on tap tone and shock breakage.
[0006]
[Means for Solving the Problem]The first solid of revolution that possesses an attachment part for attaching said purpose, enabling free rotation according to this invention, Transmit nonlinearly a rotation of the second solid of revolution that formed a crevice which accommodates a viscous body and was provided relatively to the first solid of revolution between this first solid of revolution enabling free rotation, and the first solid of revolution centering on an attachment part to the second solid of revolution, and. In rotation of the first solid of revolution centering on an attachment part, It is attained by damper possessing a rotation transmission means to change a resistance force to rotations of the first solid of revolution centering on an attachment part resulting from viscous resistance of a viscous body produced in mutual relative rotation with the first solid of revolution and the second solid of revolution.
[0007]According to this invention, said purpose is attained by step parking brake which uses the above-mentioned damper for a pedal arm.
[0008]What is constituted so that said resistance force may be changed as a means of rotation transmission of this invention based on an angle of rotation of the first solid of revolution and the second solid of revolution, Or so that a running torque radius of the second solid of revolution to the first solid of revolution may be changed and a resistance force may be changed, it may be constituted and an end can attach to the first solid of revolution in an attachment part and homotopic as the desirable example, enabling free rotation -- ****** -- with the first arm. Although a thing possessing the second arm to which one end comes to adhere to the second solid of revolution, and an engagement means with which the other end of the second arm is made to engage to the other end of the first arm, enabling rotation relatively free [movement] and free can be mentioned, A fitting groove where an engagement means was formed in the other end of one arm among the first and the second arm here, Even if it provides a piece fitted in enabling free

movement to this fitting groove, and an axis which supported this piece, enabling free rotation and was provided in the other end of an arm of another side among the first and the second arm, A fitting groove formed in the other end of one arm among the first and the second arm, a piece fitted in enabling free movement to this fitting groove, and this piece adhere, Even if it provides an axis provided in the other end of an arm of another side among the first and the second arm enabling free rotation, further, A fitting groove formed in the other end of one arm among the first and the second arm, May provide a cylinder body or a column body which was fitted in enabling free movement to this fitting groove, and was provided in the other end of an arm of another side among the first and the second arm, or may be it any, and in short, What is necessary is just to make the other end of the second arm engaged to the other end of the first arm, enabling rotation relatively free [movement] and free.

[0009]Although a viscous body accommodated in a crevice is made to generate viscous resistance in mutual relative rotation with the first solid of revolution and the second solid of revolution and this obtains damper mechanism in this invention, As viscous shear strength is generated, it may be made to mainly obtain damper mechanism by this in a desirable example. As a viscous body, although a viscous body with a coefficient of viscosity of about 1000-400000 P, for example, a silicone oil etc., is preferred, it may not be limited to this but other viscous bodies, for example, viscous fluid, may be sufficient.

[0010]

[Function]In the damper of this invention, if the first solid of revolution attaches and a part is rotated as a center, the second solid of revolution will rotate relatively to the first solid of revolution via the means of rotation transmission.In the relative rotation of this first solid of revolution and second solid of revolution, viscous resistance occurs in the viscous body accommodated in the crevice, This serves as a resistance force to the relative rotations of the first solid of revolution and the second solid of revolution, and performs the damper action to the pedal arm of the member turning around the first solid of revolution, for example, a step parking brake. And the means of rotation transmission attaches, and transmit nonlinearly the rotation of the first solid of revolution centering on a part to the second solid of revolution, and. In order to change the resistance force to rotations of the first solid of revolution centering on the attachment part which originates in the viscous resistance of the viscous body produced in mutual relative rotation with the first solid of revolution and the second solid of revolution in rotation of the first solid of revolution centering on an attachment part, Desired rotational resistance can be obtained in the arbitrary rotary places of the first solid of revolution centering on an attachment part.

[0011]Next, this invention is explained still in detail with reference to the desirable

example shown in a figure. This invention is not limited to these examples at all.
[0012]
[Specific Example(s)]The first solid of revolution 4 that possesses the attachment part 3 for attaching the damper 1 of this example, enabling free rotation in drawing 1 and drawing 2, the rotation of the second solid of revolution 7 that formed the crevice 6 which accommodates the viscous body 5, and was provided relatively to the solid of revolution 4 between the solids of revolution 4 enabling free rotation, and the solid of revolution 4 centering on the attachment part 3 is nonlinearly transmitted to the solid of revolution 7 -- it carrying out and. In rotation of the solid of revolution 4 centering on the attachment part 3, a rotation transmission means 8 to change the resistance force to rotations of the solid of revolution 4 centering on the attachment part 3 resulting from the viscous resistance of the viscous body 5 produced in mutual relative rotation with the solid of revolution 4 and the solid of revolution 7 is provided. He is trying to make the viscous body 5 generate viscous shear strength in this example by mutual relative rotation with the solid of revolution 4 and the solid of revolution 7.
[0013]the solid of revolution 4 -- half [one] -- the housing body 11 which is a percent person object, and half [of another side] -- the lid 12 which is a percent person object, [provide and] It consisted of the housing 14 which formed in the inside the chamber houses 13 in which the viscous body 5 is accommodated, and the housing body 11 and the lid 12 have adhered so that it may double exactly by the mating faces 15 and 16 and may not separate mutually by the rivet 17. The seal ring 18 is fitted in the annular hollow 19 formed in the mating face 16 of the lid 12 sc that the viscous body 5 may not begin to leak from the mating faces 15 and 16 of the housing body 11 and the lid 12. The housing body 11 possesses the attachment hole 25 which carried out the opening in the field 24 of another side of the outline elliptic plate-like base 21, the cylindrical shank 23 which projected in one and was formed from one field 22 of the base 21, and the base 21, and was continued and extended to the base 21 and the shank 23, and was formed in the shank 23 and the same mind.
The breakthrough 26 is formed in the part equivalent to the attachment part 3.
The lid 12 is projected in one from the outline elliptic plate-like base 31 and one field 32 of the base 31, and possesses the shank 23, the body 33 formed in the same mind, and the inner direction annular flange 34 formed in the inner direction in one from the body 33.
The breakthrough 35 the breakthrough 26, concentric, and isomorphous is formed in the part equivalent to the attachment part 3.

[0014]The solid of revolution 7 possesses annular Itabe 41 allotted to the chamber houses 13 and the cylindrical part 42 which projected in one from annular Itabe 41,

was formed in the shank 23 and the same mind, and was attached in the shank 23 enabling free rotation.
In the cylindrical part 42, two or more projected rims 44 are formed in the peripheral face of the cylindrical part 43 of a byway in one at the circumferencial direction. The seal ring 45 is formed so that the viscous body 5 may not begin to leak between the body 33 and the cylindrical part 42.
[0015]by this example, the end 51 can attach the means 8 of rotation transmission to the solid of revolution 4 in the attachment part 3 and homotopic, enabling free rotation -- ****** -- with the first arm 52. The second arm 54 to which the one end 53 comes to adhere to the solid of revolution 7, and the engagement means 57 which makes the other end 55 of the arm 52 relatively engaged in the direction of A to the other end 56 of the arm 54, enabling rotation free free [movement] in the direction of B are provided. It is formed cylindrical, is inserted in the breakthroughs 26 and 35, enabling free rotation, and can attach to the solid of revolution 4 by this, enabling free rotation, and the end 51 of the arm 52 is **********. The color 61 made from aluminum is attached in the cylindrical end 51 by being carried out so that it may not rotate relatively mutually by mutual engagement of the gear teeth 62 and 63 formed in the inner skin of the end 51 and the peripheral face of the color 61, respectively. The projected rim 44 fitted into two or more grooves 71 formed in the inner skin, and the end 53 of the arm 54 formed cylindrical has adhered to the solid of revolution 7 so that it may not rotate relatively to mutual. The fitting groove 76 formed by extending the engagement means 57 in the direction of A to the other end 56 of the arm 54 by this example, The cylindrical axis 79 provided in the fitting groove 76 in one at the other end 55 of the arm 52 in support of the piece 77 of the rectangular parallelepiped shape fitted in enabling free movement in the direction of A and the piece 77 free [rotation in the direction of B] is provided.
[0016]The damper 1 formed as mentioned above is applied to the step parking brake 81, as shown, for example in drawing 3. Here, it is fixed and the damper 1 is used so that the end 51 of the arm 52 may not rotate into the body 84 of a car with the bolt 83 inserted in the breakthrough 82 of the color 61. And the pedal arm 85 of the step parking brake 81, In the homotopic fixed to the body 84 of a car, on the other hand, it is attached to the body 84 by the end 51 of the arm 52, enabling free rotation, and on the other hand, The really formed shank 91 is attached in the attachment hole 25, and it is used for the pedal arm 85 so that it may connect with the solid of revolution 4 in the center of rotation of the solid of revolution 7 to the solid of revolution 4. In this invention, the pedal arm 85 does not need to be connected with the solid of revolution 4 in the center of rotation of the solid of revolution 7 to the solid of revolution 4, and may be other parts. The pedal arm 85 is energized by the pedal initial rotating position (position shown in drawing 3) by the elastic means 92 so that a rotation return may be carried out. The line 97 and the crossed axes angle

alpha which connect with this example the line 95 which connects the center of rotation 93 of the arm 52 and the center of rotation 94 of the arm 54, and the center of rotation 93 of the arm 52 and the center of rotation 96 of the piece 77 in a pedal initial rotating position at 50 degrees. In the pedal maximum treading-in position (position shown in drawing 4), the damper 1 and the pedal arm 85 are attached, respectively so that it may become 0 degree.

[0017]In the step parking brake 81 with damper 1 constituted as mentioned above, by getting into the pedal 98, it rotates in the direction of R centering on the part of the bolt 83, and the housing 14 also rotates the pedal arm 85 in the direction of R centering on the part of the bolt 83 with this. The arm 54 which engages with the other end 55 of the arm 52 by the other end 56 via the engagement means 57 by rotation of the housing 14 rotates in the direction of C. The piece 77 attached to the other end 55 of the arm 52 via the axis 79 enabling free rotation moves in the direction of A during rotation of this direction of C along the fitting groove 76 formed in the other end 56 of the arm 54, rotating. If the arm 54 rotates in the direction of C, the solid of revolution 7 to which the end 53 of the arm 54 adhered, As a result of rotating relatively to the direction of C to the housing 14, annular Itabe 41 also rotates relatively [it is the same and] to the direction of C to the housing 14, Viscous shear strength arising in the viscous body 5 of the chamber houses 13 by this, and the resistance force to rotation of the pedal arm 85 being given by this viscous shear strength, the pedal arm 85 is brought to the maximum treading-in position as shown in drawing 4, and the maximum brakes are applied. When treading in to the pedal 98 is canceled in the maximum treading-in position as shown in drawing 4, by the elastic means 92 the pedal arm 85, Rotate to the above and reverse and viscous shear strength arises in the viscous body 5 like the above during this rotation, The pedal arm 85 returns to an initial position as shown in drawing 3, the resistance force to rotation of the pedal arm 85 being given by this viscous shear strength, and that rotation is stopped in contact with a stopper (not shown).

[0018]By the way, if the transfer characteristic about the rotation of the means 8 of rotation transmission of this example is seen by the relation between the crossed axes angle beta of the line 99 and the line 95 which connect the center of rotation 94 of the arm 54, and the center of rotation 96 of the piece 77, and the aforementioned crossed axes angle alpha, it will become like the formula 1.

[0019]

[Formula 1]

$$\tan\beta = \frac{M\sin\alpha}{L - M\cos\alpha}$$

[0020]L is the distance of the center of rotation 93 and the center of rotation 94,

and M is the distance of the center of rotation 93 and the center of rotation 96 here. And as an example if the distance of L= 43.13 mm, and M= 27.63 mm, the relation between the crossed axes angle alpha and the crossed axes angle beta will become as it is shown in Table 1. Thus, as the means 8 of rotation transmission of this example is expressed with the formula 1 to the solid of revolution 7, it transmits the rotation of the solid of revolution 4 to it nonlinearly.

[0021]

[Table 1]

Crossed-axes-angle alpha** crossed axes angle beta**0 010 16.7720 28.8330 35.7340 38.9650 39.84 [0022]While 10 degrees of angles alpha change from 0 degree, with the damper 1, no less than 16.77 degrees of angles beta change in the process in which it returns from the pedal maximum treading-in position (alpha= 0 degree, beta= 0 degree) to a pedal initial rotating position (alpha= 50 degrees, beta= 39.84 degrees), so that clearly from Table 1, but. While 50 degrees alpha changes from 40 degrees, 0.88 degree beta only changes, therefore is rotation of the constant speed of the solid of revolution 4 from the pedal maximum treading-in position to a pedal initial rotating position, and the revolving speed of the solid of revolution 7 becomes slow gradually. The rotational resistance of the solid of revolution 4 to which this originates in the viscous shear strength of the viscous body 5, If the solid of revolution 4 rotates with constant speed by centering on the part of the bolt 83, When it means becoming small and this is considered in connection with the spring power of the elastic means 92 for a return as a pedal initial rotating position is approached, the rotational resistance of the size corresponding to the size of the spring power of the elastic means 92 will be obtained to the solid of revolution 4. [0023]In the means 8 of rotation transmission, the relation of the running torque radius X (distance of the center of rotation 94 and the center of rotation 96) and the angles alpha and beta to the solid of revolution 7 is set to Msin alpha=Xsin beta, and it is X=L-M here at the time of alpha= 0 degree. From this, the running torque radius X serves as the minimum in the pedal maximum treading-in position (alpha= 0 degree, beta= 0 degree), and serves as the maximum in a pedal initial rotating position (alpha= 50 degrees, beta= 39.84 degrees). That is, the running torque radius X becomes large as a pedal initial rotating position is approached. On the other hand, the sum (alpha+beta) of the angle alpha of the solid of revolution 4 and the angle beta of the solid of revolution 7 serves as the minimum in the pedal maximum treading-in position, and serves as the maximum in a pedal initial rotating position. That is, the sum (alpha+beta) of the angle alpha of the solid of revolution 4 and the angle beta of the solid of revolution 7 becomes large as a pedal initial rotating position is approached. By the way, the resistance force (torque) T to rotations of the pedal arm 85 of the direction which goes to the pedal initial rotating position by the spring power of the elastic means 92 so that clearly from drawing 5. If the

resistance force (torque) T1 to rotations of the solid of revolution 7 by this viscous shear strength power F1 is set to T1=F1 and X by making into F1 viscous shear strength power produced by the viscous body 5, it will become like the formula 2.

[0024]

[Formula 2]

$$T=F1\cos(\alpha+\beta)=\frac{T1}{X}\cos(\alpha+\beta)\cdot M$$

[0025]Therefore, when the pedal arm 85 rotates from the pedal maximum treading-in position to a pedal initial rotating position by the elastic means 92 in the damper 1, Since the running torque radius X becomes large gradually and the sum (alpha+beta) of the angle alpha of the solid of revolution 4 and the angle beta of the solid of revolution 7 becomes large gradually as the pedal arm 85 approaches a peda initial rotating position, The resistance force (torque) T to the pedal arms 85 becomes small gradually so that clearly from the formula 2. Namely, the resistance force T to rotations of the solid of revolution 4 centering on the part of the bolt 83 which originates in the viscous resistance of the viscous body 5 which the means 8 of rotation transmission produces in mutual relative rotation with the solid of revolution 4 and the solid of revolution 7 in the damper 1. Make it change so that it may become small gradually based on the sum (alpha+beta) of the angle alpha of the solid of revolution 4, and the angle beta of the solid of revolution 7 in this example changed based on the angles of rotation alpha and beta of the solid of revolution 4 and the solid of revolution 7, and. It comprises this example which changes the running torque radius X of the solid of revolution [as opposed to the solid of revolution 4 for the resistance force T concerned] 7, and is changed in order to make it change so that it may become small gradually. Thus, as the pedal arm 85 approaches a pedal initial rotating position, In the step parking brake 81 possessing the damper 1 which becomes small gradually, the resistance force (torque) T to the pedal arms 85. The crash to the stopper of the pedal arm 85, etc. is conjointly avoided in connection with the spring power of the elastic means 92 with the nonlinear communicative function of a rotation, and things are made, and also rotation of the pedal arm 85 near the initial position can be made quick to a request.

[0026]By the way, although the piece 77 was attached to the axis 79 in the above, enabling free rotation, It may replace with this, the piece 77 may be adhered to the axis 79, and the axis 79 may be formed in the other end 55 of the arm 52, enabling free rotation, Form the piece 77 in the axis 79, enabling free rotation, also form the axis 79 in the other end 55 of the arm 52, enabling free rotation, and also above, in order to increase a mechanical strength, constituted the engagement means 57 using the piece 77 allotted to the fitting groove 76 so that field contact might be

carried out, but. Without replacing with this and using the piece 77, so that line contact may be carried out in the fitting groove 76, Although a cylinder body or a column body may be provided in the other end 55 of the arm 52, and an engagement means may be constituted, and a cylinder body or a column body may be attached to the other end 55 of the arm 52 in this case, enabling free rotation or it may adhere, in order to secure smooth movement and rotation, that of attachment is good free [rotation].

[0027]

[Effect of the Invention]According to this invention, transmit nonlinearly the rotation of the first solid of revolution centering on an attachment part to the second solid of revolution as mentioned above, and. Since it comes to provide a rotation transmission means to change the resistance force to rotations of the first solid of revolution centering on the attachment part which originates in the viscous resistance of the viscous body produced in mutual relative rotation with the first solid of revolution and the second solid of revolution in rotation of the first solid of revolution centering on an attachment part, For example, a predetermined resistance force can be given to the rotation to the member which reclining seats, such as a pedal arm of a step parking brake, a large-sized pivoted window, and a car, etc. rotate, Return rotating speed and the return time required can be made into a desired thing to the member to rotate, and also the crash to the stopper in an initial position, etc. can be avoided, and fear, such as basing-on tap tone and shock breakage, can be abolished.

[Translation done.]